

# Signals

Last month we looked at some early historical attempts to communicate with space. This month we move a little closer in time, looking at the 20th century and the dawn of radio communication. R.A.S. Hennessey continues his look at the current state of affairs...



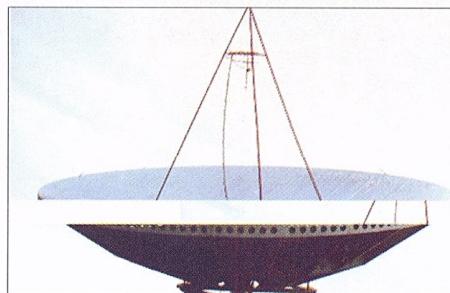
During the 1909 exchanges, for example, Professor David Todd of Amherst College planned to set off in a balloon with a radio receiver, listening for Martian signals at an altitude of ten miles. Objections to the Todd plan included an observation that he would have difficulty distinguishing a Martian signal from one emanating from "about 2,000 radio stations scattered over the earth." The dawn of the electronic age was coming up fast. In spite of these promising ideas, techniques for radio astronomy took time to develop. Proposals continued to be made, some of a traditional kind such as vast magnesium-powder flashes of a scale to be seen on Mars, but others at the state of the art. One such came from E W Barnes, Bishop of Birmingham (himself a scientist) in 1931 when he described the possibility of interstellar radio communication, thus extending the debate far beyond the solar system.

The religious aspect of space signals linked mid-twentieth century CETI with the complex and often furious debates of earlier times regarding the uniqueness, or otherwise, of humanity on Earth: if other life existed elsewhere was it innocent in its Edens, or had it fallen and become corrupt? If so, did God's incarnation on Earth suffice for the rest of the universe? The cosmologist E. A. Milne, writing in the early 'fifties proposed a solution to the conundrum. His response was that "now that knowledge of it would be capable of being

transmitted by signals to other planets . . . the re-enactment of the tragedy of the crucifixion in other planets would be unnecessary." Although a neat answer, this still begged many questions.

## "Earth Calling!"

Milne wrote at a time when radio astronomy was getting into its stride and the idea of transmitting signals to outer space was becoming feasible; the third, current phase of CETI. In practice, radio astronomy then and since has been almost entirely concerned with reception, not transmission. The little time it has devoted



to ETI has been in the searching mode, scanning the heavens for intelligible incoming signals.

The chief developments in space signalling have been satellite relaying, directives to space probes, and the traffic of signals between Earth-bound humans and their fellows on the Moon, or orbiting the planet. Whilst this mass of communications proves the feasibility of space signalling, it is not specifically CETI, that which Gauss and the signalling enthusiasts had in their minds. On the other hand, the Arecibo Message of 16 November, 1974 was precisely what the advocates of space signals had always dreamed of.

The Arecibo Interstellar Message was masterminded by Frank Drake. It was transmitted from the Arecibo Radio Observatory in Puerto Rico; a 169-second burst powered by 3 terrawatts and aimed at the Great Cluster M13 in Hercules, some 300,000 stars with a radius of about 18 light-years. Since M13 is about 25,000 light-years from Earth, any reply will

take about 50,000 years to reach us at the earliest. Short of developments in physics as yet barely imagined it would appear that the sheer distances involved present us with another aspect of 'interstellar quarantine' – unless conversation bites separated by many thousands of years can be said to constitute some kind of discourse.

Drake's message, which is now some 35 light-years from Earth, was put in the form of binary notation which converts well into a series of radio pulses. It consisted of 73 rows of 23 characters each, making 1,679 bits of information. Provided the receiving party finds binary notation logically intelligible he, she or it might be able to convert the pulsed message into a tapestry-like diagram bearing, *inter alia*, a binary representation of numbers 1-10; the composition and configuration of a DNA molecule; a human figure; and the Arecibo Observatory. The age-old snag of attempting to signal unknown and possibly unknowable recipients remains; even a culture whose development had deviated but slightly from that one on Earth which had sent the message might find it incomprehensible, as indeed might more than a few Terrans.

## A direct mailing might do the trick

There have been two further attempts at CETI: American space probes designed to bear messages, hopefully to be unravelled by any ETI coming across them in the far future. First, in June 1983 the spacecraft Pioneer 10 (originally launched in 1972) left the solar system bearing a 152 x 229 mm gold-anodized aluminium plate upon which were etched six diagrams including pictures of a naked man and woman, the position of the sun vis-a-vis certain pulsars in our galaxy, and the solar system. Pioneer 11 bore an identical message. Although the idea of the plaques came from others, Frank Drake and Carl Sagan, both eminent scientists and both sympathetic to the concept of ETI, took up the suggestion and greatly influenced the resulting project. They ran into opposition, for example from femi-